

REMARKS

By this Amendment, Applicant has amended Claims 2, 5, and 15. Claims 1-15 remain pending in the application. Claims 1, 2, 5, 8, 14, and 15 are independent claims.

The Office Action has been carefully reviewed, and the amendments and arguments made herein are made in a genuine effort to bring the application into condition for allowance.

The Present Invention

The present invention provides an apparatus and method for precisely aligning a grit blasting nozzle. The invention includes a movable bracket, a nozzle dimensioned and configured for rapid, precise installation within the movable bracket, and may also optionally include a fixed bracket with at least one proximity sensor.

The nozzle housing includes a flat surface and a shoulder, with each being dimensioned and configured to abut a corresponding surface on the movable fixture bracket. The nozzle also defines a means for being secured at exactly the same height with respect to the movable bracket each and every time it is utilized. Specifically, one preferred embodiment includes an angled surface on the nozzle housing dimensioned and configured to abut a spring-biased pin within the movable bracket. When the nozzle is inserted into the movable bracket, the pressure of the spring-biased pin against the angled surface will push the nozzle further into the bracket until the shoulder on the housing abuts the bracket, thereby precisely locating the nozzle in the same position relative to the bracket each and every time the nozzle is inserted into the bracket.

The movable bracket includes a first arm dimensioned and configured to removably secure the grit blasting nozzle, a second arm dimensioned and configured to removably secure a proximity sensor, and a grit blasting machine engaging portion dimensioned and configured for sliding motion within a desired range of distances from the workpiece.

If a proximity sensor is desired, then the fixed bracket will be used to support either the sensor or the sensor's target. The fixed bracket therefore include means for being secured to the grit blasting machine in close proximity to the movable bracket,

and an arm dimensioned and configured to removably secure a proximity sensor or a sensor target.

A proximity sensor secured within one bracket may be utilized to detect the distance between the proximity sensor and the proximity sensor target on the opposing bracket, from which the distance between the nozzle and the workpiece target region can be calculated. One preferred proximity sensor is an inductive resistance proximity sensor, which is well known in the art of proximity sensors.

The Cited Art

U.S. Patent No. 5,759,086 (Klingel) describes a machine for cutting workpieces. The machine includes a pair of cutting nozzles which are preferably water jet nozzles but may use other abrasives, with one cutting nozzle being movable with respect to the other so that the angular relationship between the water jets may be varied. The distance from the cutting nozzles to the workpiece may be varied, and the entire cutting head, including both nozzles, may be pivoted around an axis passing through one of the two nozzles. Each nozzle has its own water or abrasive supply, so that the characteristics of each jet may be adjusted as required. While this patent discloses highly variable positioning of each of the cutting nozzles, it does not disclose any means for removing the nozzles from a desired position, and then quickly and precisely returning them to that position.

Rejection of Claims 1, 4, and 14 Under 35 U.S.C. § 102

The Examiner rejected Claims 1, 4, and 14 under 35 U.S.C. § 102(b) as being anticipated by Klingel. Applicant respectfully requests reconsideration of this rejection and allowance of these claims.

Klingel discloses a cutting machine which may be a water jet cutting machine, but which may also use alternative abrasives. Although it includes means of removably securing a nozzle, and repeatedly positioning the nozzle, it does not include means for ensuring that the position of the nozzle is repeated in a substantially identical manner. Furthermore, Klingel does not disclose any means for precisely positioning the nozzle at a desired distance from the workpiece.

Claim 1 recites a movable bracket having means to removably secure a nozzle assembly therein, and to repeatedly position the nozzle therein in a substantially identical manner. Not only does the bracket permit removal and replacement of the

nozzle, but the bracket also ensures that the nozzle is returned to the bracket in a substantially identical manner when it is replaced within the bracket. For example, in one preferred embodiment, the pressure of the spring-biased pin against an angled surface defined on one portion of the nozzle will push the nozzle farther into the bracket until a shoulder defined on the housing of the nozzle abuts the bracket. Additionally, the nozzle and bracket may include corresponding flat surfaces to ensure that the nozzle may only be inserted within the bracket in one rotational position.

Claim 1 also recites that the grit blasting assembly includes means for repeatedly and precisely positioning the nozzle substantially at a desired distance from the workpiece. Therefore, Claim 1 not only requires that the nozzle be repeatedly positioned at a desired distance from the workpiece, but that it be precisely positioned there. For example, one preferred embodiment includes a proximity sensor, with the proximity sensor target being located in the same bracket as the nozzle, and a second proximity sensor being located in a fixed bracket. By moving the bracket holding the nozzle until the proximity sensor is precisely the desired distance from the target, the nozzle is also precisely the desired distance from the workpiece.

Claim 4 further recites corresponding alignment guide surfaces on the nozzle assembly and the movable bracket. The corresponding flat surfaces ensure that the nozzle can only be inserted into the bracket in one rotational position.

Claim 14 recites a method of grit blasting, including the steps of providing a movable bracket having a first arm that removably secures a grit blasting nozzle, and which repeatedly and precisely positions the nozzle substantially the same desired position. Therefore, the nozzle must not only be removably secured, but it must be repeatedly and precisely positionable within the nozzle when it is returned to the nozzle. Claim 14 further recites the step of providing a first arm dimensioned and configured to removably secure a grit blasting nozzle assembly, and to repeatedly and precisely position the nozzle in substantially the same desired position. Therefore, the grit blasting nozzle must not only be repeatedly positioned in the desired location, but precisely positioned within the same desired position.

Therefore, Claims 1, 4, and 14 are believed to be in condition for allowance.

Allowable Subject Matter

Applicant notes with appreciation that Claims 8-13 have been allowed.

Applicant notes that Claims 2, 3, 5-7 and 15 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Claim 2 has therefore been rewritten in independent form including the limitations of Claim 1. Claim 3 is dependent from Claim 2. Claim 5 has been rewritten to include all limitations of Claim 1. Claims 6-7 are dependent from Claim 5. Lastly, Claim 15 has been rewritten in independent form including all limitations of Claim 14.

Therefore, Claims 2-3, 5-13, and 15 are now submitted to be in condition for allowance.

Conclusion

For the above reasons, Claims 1-15 are now submitted to be in condition for allowance. If such is not the case, the Examiner is invited to telephone Applicant's undersigned representative so that any additional issues may be resolved.

Respectfully submitted,

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